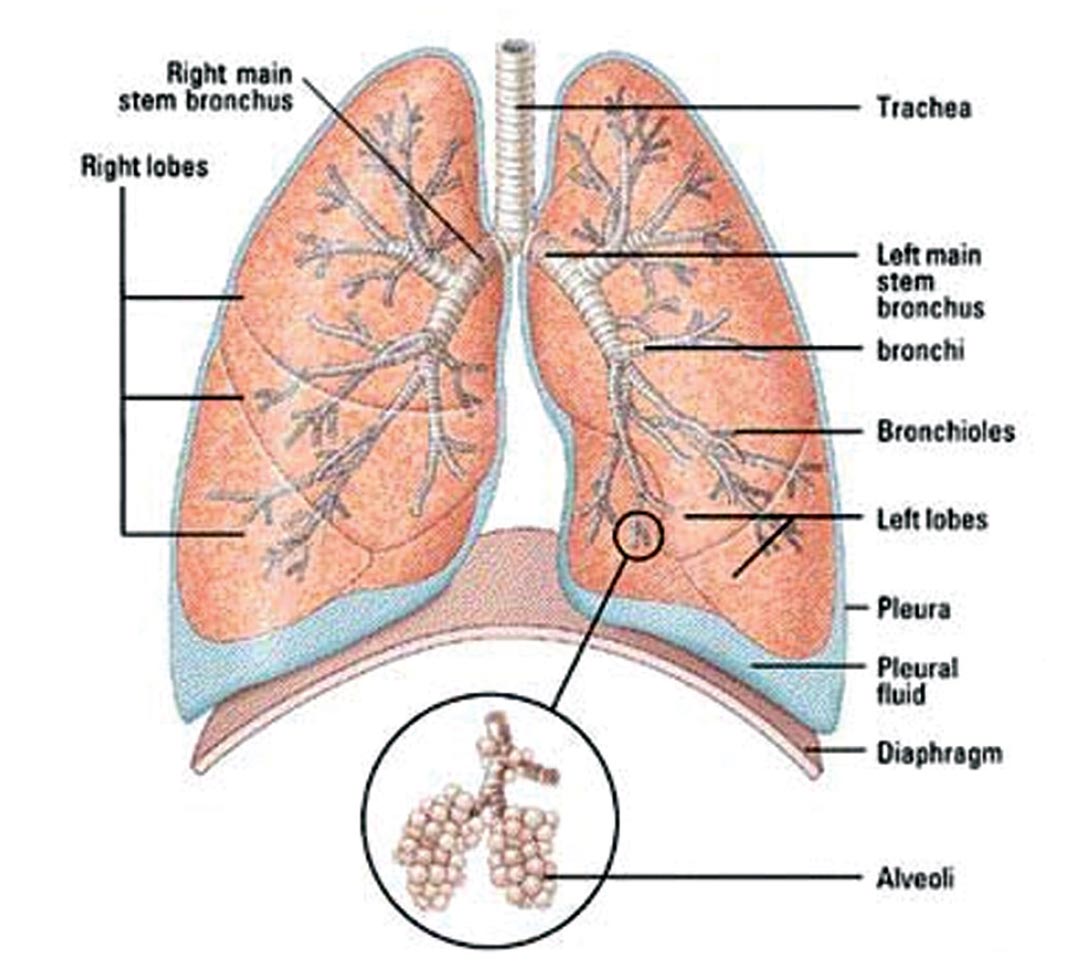
**Respiratory System and Circulatory System Concept Map**

Ms. Ottolini, AP Biology

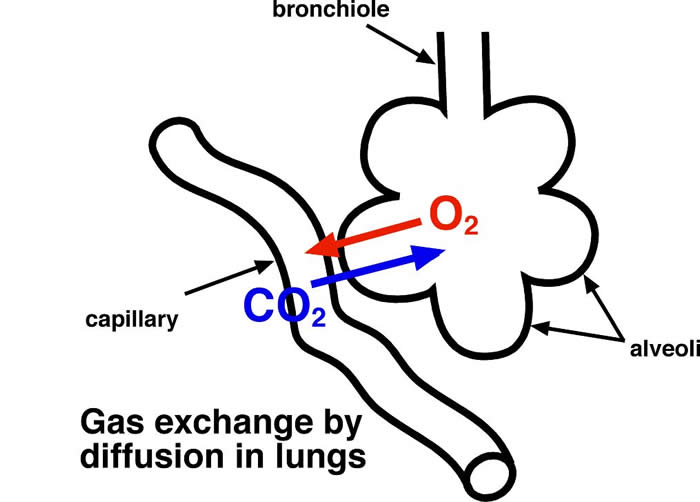
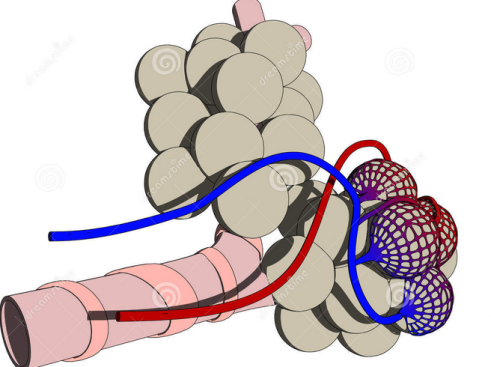
The respiratory and circulatory systems in the human body work together to deliver oxygen-rich blood to the cells and send carbon dioxide-rich blood back to the lungs to be exhaled from the body. .

As we breathe, oxygen enters the nose or mouth and passes the sinuses, which are hollow spaces in the skull. Sinuses help regulate the temperature and humidity of the air we breathe.

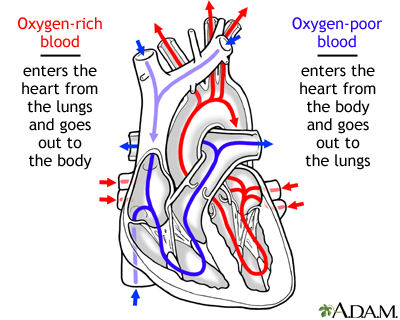
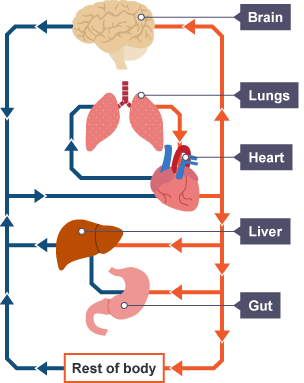
The trachea, also called the windpipe, filters the air that is inhaled. It branches into the bronchi, which are two tubes that lead into smaller bronchiole tubes. The bronchi lead into the lungs, and the bronchioles are inside the lungs themselves. The bronchi and bronchioles are lined with tiny hairs called cilia. Cilia move back and forth, carrying mucus up and out. Mucus, a sticky fluid, collects dust, germs and other matter that has invaded the lungs. We expel mucus when we sneeze, cough, spit or swallow.

The bronchioles lead to the alveoli, small spongy sacs in the lungs where the exchange of oxygen and carbon dioxide occurs. The alveolar walls are extremely thin (about 0.2 micrometers). These walls are composed of a single layer of cells called epithelial cells and tiny blood vessels called pulmonary capillaries.

After air is inhaled, oxygen diffuses from the alveoli into the pulmonary capillaries and binds to hemoglobin proteins, which are located in red blood cells.



From there, the oxygen-rich blood travels through larger blood vessels to reach the heart. The heart, which is very muscular, pumps this blood through large blood vessels called arteries to smaller blood vessels called arterioles to even smaller capillaries in the tissues of the body. There are tiny capillaries in nearly every tissue in the body. Once in these capillaries, oxygen detaches from hemoglobin and diffuses through the capillary walls into the body’s cells.

After the cells undergo cellular respiration, they must release carbon dioxide, a waste product of cellular respiration. Carbon dioxide diffuses into the capillaries and travels with the blood to larger blood vessels called venules and even larger blood vessels called veins, which re-enter the heart. The heart then pumps this blood to the lungs, where it diffuses from the lung capillaries into the alveoli. Carbon dioxide rich air can then be exhaled.

*Note: Arteries carry blood away from the heart, and veins carry blood to the heart. Also, blood that has a lot of oxygen is called oxygenated blood and is often shown in red on diagrams. Blood that has very little oxygen and a lot of carbon dioxide is called deoxygenated blood and is often shown in blue on diagrams.*

Thank you to LiveScience for providing some of this information!

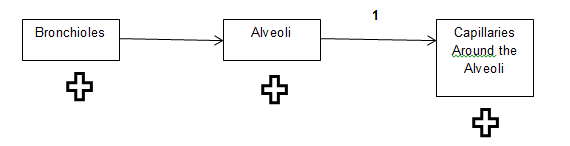
**Your Assignment:** Create a flowchart like the one given below using the following terms… arteries, veins, heart, trachea, bronchioles, alveoli, capillaries near the cells of the body, cells of the body, bronchi, capillaries around the alveoli. Your flowchart should show the path of oxygen through the blood to the cells of the body and the path of carbon dioxide from the cells of the body through the blood back to the lungs. Some terms will be used more than once.

On your flowchart, you must indicate any connection where diffusion is occurring with a number. In a key like the one given below, you must identify the substance that is diffusing (ex: oxygen) and explain WHY it is diffusing in a particular direction (ex: from the alveoli into the capillaries around the alveoli) based on its concentration in both locations.

On your flowchart, you must also indicate where cellular respiration is occurring with a star (\*). In your key, explain how you know that cellular respiration is occurring here. There should only be one location where you put a star.

On your flowchart, you must indicate the concentration of oxygen in the blood or air by putting a plus sign (-) next to any term in which the air or blood is oxygen-rich, and a minus sign (-) next to any term in which the air or blood is oxygen-poor. Each term in your flowchart must have a plus or minus sign EXCEPT for the cells of the body. You do not need to “explain” your + and – locations in your key.

**Example Flowchart (starting from the bronchioles):**



**Example Key:**

|  |  |
| --- | --- |
| **# or \*** | **Explanation** |
| 1 | Here, oxygen gas is diffusing from a high concentration in the alveoli to a low concentration in the capillaries around the alveoli. |